Restricted

NAVY DEPARTMENT

BUMED NEWS LETTER

a digest of timely information

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Vol. 3 Friday, June 23, 1944 No. 13

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Insect Repellents: As the war has progressed, repellents have come to play an increasingly important role in the prevention of insect-borne disease. In the case of malaria, some malariologists now believe that the high relapse rates encountered in the Pacific are due largely to the heavy sporozoite dosage occasioned when personal protective measures are neglected during suppressive atabrine administration. In certain areas the incidence of filariasis alone is sufficient to warrant the extensive use of repellents. Dengue is a constant and increasing threat in many theaters of operation; epidemics of this disease frequently develop explosively and can cripple a military force almost over night.

Dimethylphthalate, alone, has been supplied in the Navy up until the present time; it is superior to either Rutgers-612 or Indalone. The combination of these repellents in the ratio of six parts dimethylphthalate, two parts Rutgers-612, and two parts Indalone, has been shown to possess a greater versatility than any one of them used singly. That the duration of repellency of the three substances varies with different species is shown by the following table in which data from field tests are compiled:

	Dimethylphthalate	Rutgers	Indalone	6-2-2 Mixture
Anopheles quadri-maculatus	206 min.	78 min.	30 min.	257 min.
Aedes aegypti	234 min.	363 min.	160 min.	321 min.
Aedes taeniorhynchus (salt marsh)	153 min.	276 min.	164 min.	212 min.
Stomoxys calcitrans (biting fly)	47 min.	101 min.	171 min.	189 min.
Eusimilium pecuarum (biting gnats)	516 min.	508 min.	478 min.	513 min.

The 6-2-2 mixture will warrant renewed interest in the use of repellents. A formula consisting of eight parts dimethylphthalate and two parts Rutger-612 may be used with results almost as good as those obtained with the 6-2-2 mixture.

Procedure for Use: When these compounds are properly applied, their repellency usually persists for about three to four hours, its duration being somewhat shortened by rain and perspiration. The efficiency varies with different species of mosquitoes. For use against mosquitoes, biting flies and gnats, about one c.c. (12 to 15 drops) should be shaken into the palm of one hand. After rubbing the hands together, an even application should be made to all exposed skin surfaces. Care should be taken to avoid mucous membranes, since this material causes a transitory disagreeable burning sensation. Similar application should be made to clothing at points where insects are likely to bite through, such as over the shoulder blades, ankles, knees, etc. The laxity of many individuals with regard to the use of repellents requires enforced or supervised use, particularly during patrols, sentry duty and other periods of unavoidable exposure.

Against the mite vector of tsutsugamushi fever, our best preventive is protective clothing. Protection by clothing may be greatly augmented by impregnation with dimethylphthalate. The undiluted dimethylphthalate, supplied in one-gallon cans, should be sprayed on clothing in an amount sufficient to moisten the surface (100 to 150 c.c. per man). An ordinary hand sprayer may be used, or, for large groups, a knapsack or paint sprayer. Clothing so treated is repellent for about one week if unwashed. Thus, the application must be repeated weekly. Field tests in heavily infected areas have shown only 0.4 bites per man for a treated group, as compared with 108.2 for an untreated group. A simpler

though inferior method consists of applying dimethylphthalate as a 1/2-inch barrier at all openings of the uniform. This is accomplished by drawing the mouth of the standard 2-ounce bottle of repellent along the cloth inside the collar and cuffs of the shirt, waist, fly and cuffs of the pants, and the socks and leggings. (F.T.N.)

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Repellents for Leeches: Although land leeches occur over a large part of the world, their local distribution is very irregular. They are especially prevalent in the Himalayan Mountains of India, in Assam, Burma, French Indo-China, Ceylon, some of the islands of the Western Pacific and certain parts of North Africa. A very moist environment is essential for their activity. Consequently, they are not usually found on plains and in cultivated areas. It is in the thick vegetation of mountain valleys that the leeches usually abound. In peacetime, few men have reason to spend much time in these places, but in wartime large numbers of men often go into these thickets for cover. Here they may find great numbers of leeches holding on to the vegetation by their posterior suckers and waving their heads about seeking contact with a host. There is something about the wavelike motion of leeches and their apparent eagerness that make them particularly repulsive, and their attacks produce a subjective effect quite out of proportion to the physical damaged produced.

One of the most important species is Haemadipsa ceylonica, a small leech about an inch long and no thicker than a common knitting needle. These leeches penetrate loosely knit clothing and go through small holes, such as those made for bootlaces. Upon reaching the skin, the leeches attach themselves and suck blood until they are nearly two inches long and about three-sixteenths of an inch in diameter. The wounds they make may continue to bleed for a long time and are often slow to heal.

Experiments have been carried out at the Naval Medical Research Institute, Bethesda, Maryland, with a view to appraising the value of the standard insect repellents in protection against leeches. Unfortunately, it has been impossible to obtain the Haemadipsa ceylonica, so experiments had to be carried out using the European, medicinal leech (Hirudo medicinalis).

It was found that when medicinal (aquatic) leeches were kept in covered pint jars containing a small amount of water, they behaved much as do terrestrial leeches, hanging above the water on the sides of the jar. At the slightest agitation of the jar, they wave their heads about and actively seek a host. An untreated arm, laid over the mouth of the jar, is quickly found and within a few seconds after attachment of the oral sucker, the skin is bitten through and feeding begins. Mechanical removal of the attached leech is very

difficult, but it was soon found that it would release its hold when the oral sucker was touched with a little alcohol.

Fresh applications of the standard insect repellents, dimethylphthalate, Rutgers-612 and Indalone were tried, and it was found that the leeches let go all holds and dropped as soon as they touched any of the materials. The duration of repellency of these compounds for leeches was longer than that for mosquitoes (Aedes aegypti).

Since insect repellents are needed in nearly all situations where leeches abound, the problem appears to be one of finding means of maintaining effective applications for the necessary periods of time and under the practical conditions of rain, sweat and rubbing. These problems are being investigated in the field. (N.M.R.I. Research Project X-217; C.S.W.)

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A recent report from the Assam-Burma area indicates that the insect repellents, Indalone, dimethylphthalate and Rutgers-612, are being used for protection against leeches by personnel operating in that area. These repellents, liberally applied to the body and to clothing, offer a fair degree of protection.

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The Type Identification of Dysentery Bacilli: The importance of bacillary dysentery as an incapacitating disease in the combat areas is second only to that of malaria; in non-malarial zones, bacillary dysentery is often the primary problem.

Sufficient reliable information concerning the distribution of serological types of the Shigellae to be of statistical value has not been collected. This deficiency has been due to a variety of factors, one of which is the lack of suitable sera for the final identification of strains isolated from carriers and from sporadic or acute cases.

Recent developments have rendered the serological identification of Shigella types relatively simple. The urgency of the dysentery problem is such that the following information is provided for the purpose of facilitating the accumulation of data on the prevalence and type distribution of Shigellae throughout the world. The Naval Medical Supply Depot, Brooklyn, New York, can now furnish sets of Shigella Diagnostic Sera for Slide Agglutination Tests on letter request or requisition on NavMed Form 4. These include monovalent, type-specific, diluted sera for the following species:

Sh. dysenteriae (Shiga)
Sh. ambigua (Schmitz)
Sh. flexneri I (''V'')
Sh. flexneri II (''W'')
Sh. flexneri III (''Z'')
Sh. flexneri IV (''Boyd 103'')
Sh. flexneri V (''Boyd 119'')
Sh. flexneri VI (''Boyd 88-Newcastle-Manchester'')
Sh. flexneri VII (''X'')
Sh. flexneri VIII (''Y'')
Sh. flexneri IX (''Boyd 170'')
Sh. flexneri X (''Boyd 288'')
Sh. flexneri XI (''Boyd D 1'')
Sh. flexneri XII (''Boyd D 19'')
Sh. flexneri XIII (''Boyd 143'')
Sh. flexneri XIV (''Boyd 274'')
Sh. alkalescens
Sh. sonnei

In addition, a polyvalent antiserum that includes the first eight flexneri antisera (types I through VIII) is available and should prove to be a useful tool. These antisera have been given a trial at the Enteric Pathogen Laboratory and have proved satisfactory.

In order to expedite the acquisition of these sera by units outside the continental limits of the United States, one set will be forwarded as soon as available to each of the following units:

Malaria and Epidemic Control Unit No. 15, 1st Marine Division
" " " " " 16, 2d " "
" " " " " 17, 3d " "
" " " " " 40, 4th " "
" " " " " 103, 5th " "

Epidemiological Unit No. 23, ComNavNaw
" " 50, "
" " 45, CinCPac
" " 105, CinCPOa
" " 106, 14th N. D.
" " 61, ComSeventh Fleet

It is strongly urged that other epidemiological units, hospital laboratories, and other naval establishments with bacteriological facilities obtain these sets of typing sera and increase their efforts toward the isolation and type-identification of dysentery bacilli.

In order that the information obtained in the field be collected at a central point, it is urgently requested that, even though type-identification has been made, cultures be forwarded to the Enteric Pathogen Laboratory, Department of Epidemiology, Naval Medical School, Bethesda 14, Maryland; pertinent epidemiological data should be given in the official letter of transmittal. Such information will be analyzed and made available to those concerned with the preparation of materials for prophylactic inoculation against bacillary dysentery.

The type-incidence of Shigellae is believed to vary to some extent in the different combat areas; it is only upon the basis of sound information regarding this point that properly combined antigens can be prepared. Some of the rarer strains have been encountered recently under circumstances that suggest a widening dissemination. (L.A.B.)

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Penicillin in Diseases of the Ear: A study of the use of penicillin in diseases of the ear has been made at the U. S. Naval Hospital, Bethesda, Maryland, by Swanson and Baker. The drug has been found to be of value in the treatment of acute otitis media, acute mastoiditis, acute labyrinthitis and chronic otitis media.

Infectious diseases of the ear can be effectively treated with penicillin because the anatomical structure of the ear permits the local administration of the drug, and because the organisms causing most acute infections of the ear are in the group considered to be susceptible to the drug. Fowler made a study of 452 consecutive cases of acute otitis media. If his statistical analysis of the causative organisms in that series is considered representative of their relative incidence, then 90 per cent of the organisms are susceptible to penicillin.

In this study the sodium salt of penicillin was used. It was given by continuous intravenous injection, intramuscular injection or local instillation. In one instance a combination of the intramuscular and local routes was used.

1. Acute Otitis Media: In acute otitis media penicillin is administered by intramuscular injection. The amount of drug necessary to combat the infection will vary according to its causative organism and severity. Staphylococcic infections, as a rule, require a larger amount of penicillin than those due to streptococci. In order to avoid possible relapses, the drug should be continued after the patient has appeared to recover.

Fifteen cases of acute otitis media, many complicated with acute mastoiditis, were successfully treated with penicillin. All of these cases had previously failed to respond to sulfonamide therapy. The pathogens obtained on culture from these patients were the following:

ORGANISM	NO. OF CASES
Staphylococcus aureus	2
Hemolytic Staphylococcus aureus	2
Streptococcus hemolyticus	8
Pneumococcus Type 1	1
Hemolytic Staphylococcus aureus and Streptococcus hemolyticus	2

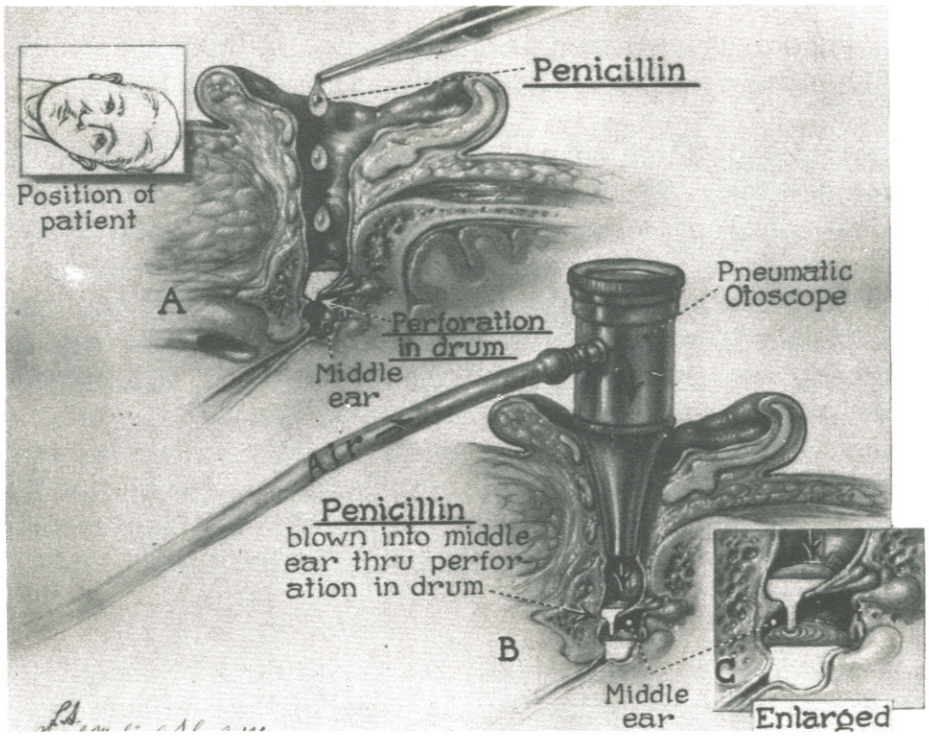

Fig. 1-A: Instillation of penicillin into the external canal.
Fig. 1-B and 1-C: The use of the pneumatic otoscope in chronic otitis media.

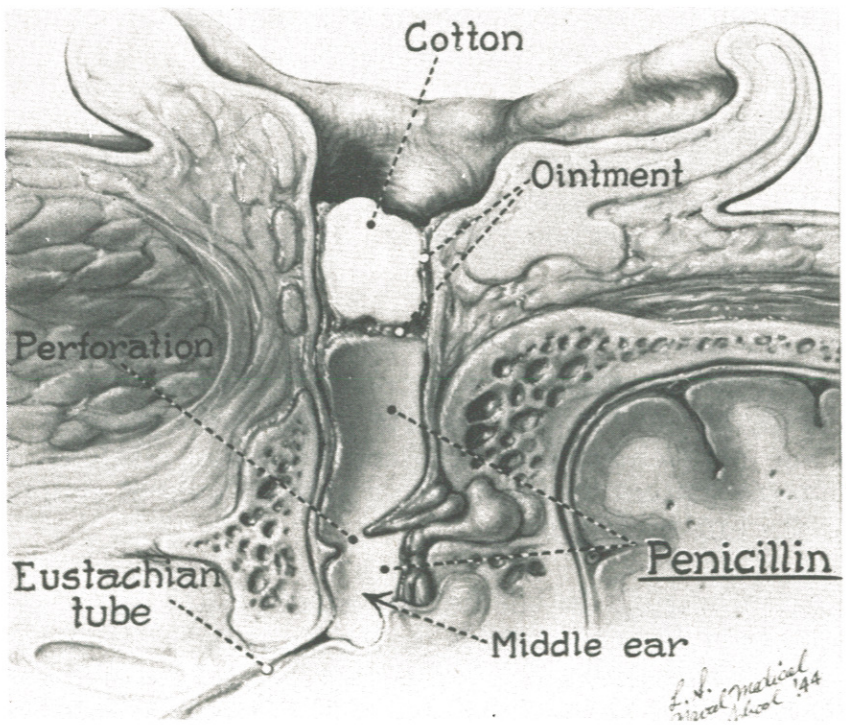

Fig. 2: Penicillin sealed in external canal and middle ear by cotton impregnated with ointment.

The amount of the drug required per patient varied between 360,000 and 1,140,000 units given over a period of from five to fourteen days.

2. Acute Mastoiditis: When surgery is performed for acute mastoiditis, it can be supplemented by penicillin administered either by intramuscular injection or by local instillation into the mastoid cavity. Florey and Florey employed the latter method in 22 cases of surgical mastoiditis using controlled drainage. They inserted a rubber tube into the mastoid cavity and closed the incision completely except to accommodate the tube. Penicillin was instilled into the cavity through the tube, which was then sealed off. Afterwards, every six hours the exudate was aspirated from the cavity through the tube, and fresh penicillin was instilled and the tube again sealed. Free drainage was not allowed at any time. This routine was employed for a period of five days and an average of 17,300 units per case was required. The ear usually became dry within a period of five days and primary healing took place in 19 of the 22 patients.

Two cases of acute mastoiditis have been treated with penicillin by Swanson and Baker. In one the intramuscular administration was begun four days before the operation and continued until the seventh postoperative day. Local treatment of the operative wound was carried out by means of the method of Florey and Florey, a solution containing 1,000 units per c.c. being employed. The other patient received only local postoperative penicillin therapy, a solution containing 250 units per c.c. being used. In both cases the causative organism was the Streptococcus hemolyticus. In each, penicillin appeared substantially to shorten convalescence.

3. Acute Labyrinthitis: The authors describe a patient who had an acute labyrinthitis on the left side, with the exudate working its way through into the middle ear. The infection was an hematogenous one and apparently secondary to osteomyelitis of the petrous pyramid. No operative procedure was performed other than myringotomy.

A Staphylococcus aureus hemolyticus was cultured from the middle ear. This same organism had previously been cultured from a vertebral osteomyelitis and an empyema of the gall bladder in the same patient. Penicillin given by continuous intravenous drip resulted in prompt clinical cure of the infection, although the patient was left with complete loss of cochlear and vestibular function on the affected side.

4. Chronic Otitis Media: In special instances, patients with chronic otitis media can be treated successfully by the local instillation of penicillin into the middle ear. The patient who has a chronic discharging ear, caused by an organism susceptible to the drug, and has a large perforation of the eardrum with no evidence of granulations or cholesteatoma is best suited for

penicillin therapy. The pneumatic otoscope can be used to force the drug into the middle ear and the penicillin can be sealed into the ear by means of cotton impregnated with a bland ointment. (See Figs. 1 and 2 for illustration of technic.)

Two cases of chronic otitis media due to Staphylococcus aureus have been successfully treated by this method, but several other cases did not respond satisfactorily. Penicillin has no effect on the perforation.

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These preliminary studies in the use of penicillin in infections of the ear suggest that this drug can be used to advantage in many instances where other forms of therapy have failed. It has been possible either to avoid surgery for acute mastoiditis or to use the drug as a supplement to surgery with significant success. (The above item is an abstract of a paper which will be published in the Journal of the American Medical Association.)

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Flash-Burn Cream: The development by the Naval Medical Research Institute of an ointment for protection against flash burns was mentioned in the Bumed News Letter of October 15, 1943. Flash-burn cream is intended for protection of the face, arms, neck and hands at battle stations where flash-proof clothing cannot readily be worn, but it is not intended to replace anti-flash clothing now issued. Following the laboratory phase of development, test quantities of the cream were supplied to combat vessels. The Army subsequently adopted this protective cream for use in tanks and other armored vehicles.

Decision has now been reached that general distribution of the protective cream will be made through the naval medical supply depots to combat troops and vessels. Naval medical officers should submit requisitions for this item in quantities sufficient to supply the needs of their vessel or activity. Calculation of the number of tubes needed should be based upon (a) the number of men to be supplied and (b) the number of compartments and first-aid kits to be supplied, in somewhat the manner that the needs for S-461 anti-vesicant ointment were estimated.

An initial supply should be available for distribution some time in July. The ointment will be dispensed in two-ounce tubes and will be listed in the Supply Catalogue as No. S1-2366 Cream, Protective Flash Burn, NMRI 70. Requisition should be made on NMSD Form #4.

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Dengue: A paper by Usinger describes the recent outbreak of dengue in Hawaii and discusses its entomological aspects. According to Usinger, Hawaii was entirely free of mosquitoes until 1826 when the night-biting mosquito, Culex quinquefasciatus Say, was imported aboard the WELLINGTON from Mexico. The day-biting mosquitoes arrived in Hawaii somewhat later. However, by 1892 Aedes aegypti (Linn.) were found throughout the islands and by 1902 Aedes albopictus (Skuse) were very numerous.

The first epidemic of dengue in Hawaii occurred in January 1903. It lasted about a year and it is estimated that there were about 30,000 cases. This epidemic followed the arrival of the steamer DORIC, 23 days out of Hong Kong with 12 cases of dengue aboard. The second outbreak of dengue in Hawaii occurred in 1912. Although official reports record only 108 cases for that year, older residents state that most of the population had dengue at that time.

The exact source of the recent outbreak of dengue is not known. The first two cases were reported on July 24, 1943, one from the Waikiki district and one from the Nuuanu Valley. Most of the early cases apparently originated in the Waikiki district and it was reported that they occurred in a large rooming house where lived commercial fliers recently returned from the South Pacific. By August 8 the disease had become so widespread in Waikiki that the whole district was declared "out of bounds" for military personnel. However, as a result of measures taken to eliminate larvae and adult mosquitoes, the Aedes mosquitoes had been practically eliminated by September 13, and the restriction was lifted. Scattered cases continued in various parts of Honolulu, and late in September another major focus developed, this time near the center of the city in the Kakaako district. A large laundry in this district had failed to follow up the larvicidal work with regular adult spraying, and not until 70 employees were absent because of dengue did the management recognize the danger and take active steps to control the mosquito menace. With such a start the infection spread rapidly and cases were reported for the city as a whole at an average rate of 100 per week. At the peak of the epidemic 168 cases were reported in a single week. By the end of December 1943 only about 25 cases per week were being reported, but the total number of cases had reached 1,340.

The clinical picture of the cases was in general typical. The depression and bone ache were less severe than in some epidemics. Only about one-half of the cases had a rash, and the characteristic saddleback temperature was present in only about 50 per cent. Leukopenia was the usual finding in those cases where white blood cell counts were done.

The vectors in this epidemic were apparently Aedes aegypti and Aedes albopictus. It is of interest that of the two possible vectors, A. aegypti and

A. albopictus in this epidemic, the latter was the dominant species. Surveys showed 85 per cent of the day-biting mosquitoes in Honolulu to be A. albopictus, and only 15 per cent A. aegypti. A. albopictus was found breeding in the town in ant cups, flower pots, tin cans, bottles, a paper box, jars, tires, tanks and water plants. A. aegypti and A. albopictus were found to be alike in the following respects: (1) both have urban breeding habits; (2) both are daytime biters and do not bite at night; (3) both most commonly lay their eggs at or above the water's edge; (4) both have a short flight range; (5) both are silent in flight; (6) both prefer human blood to the blood of animals.

In this epidemic the spot distribution of the dengue cases was more closely correlated with the density of human population than with the density of mosquito population. It died out rapidly without secondary cases in an area with a very high breeding index and scattered human population, while it spread rapidly in an area with a low breeding index but with a dense human population living in small unscreened houses.

Dengue epidemics may be eliminated in three ways. In temperate regions the first frost kills all adult mosquitoes outside and stops the epidemic. In tropical oceanic islands most of the population contracts dengue during an epidemic and the disease gradually disappears, probably because of individual immunity. Finally, dengue may be eliminated by reducing mosquitoes below the threshold of sanitary importance. Since frost does not occur in Honolulu and since it is imperative that such a general involvement of the whole population as in 1903 and 1912 be avoided for military reasons, the third and most difficult course had to be pursued in the present epidemic. Elimination of dengue depends upon a general lowering of mosquito breeding below the level of sanitary importance. This is the point beyond which mosquitoes are so scarce that, with their short flight range, they do not reach dengue cases during the short period of infectivity of the disease.

At the moment it would appear that prompt reporting and isolation of patients and emergency spraying of local foci to kill infected adult mosquitoes should hold the epidemic at its present relatively low level. Meanwhile, the basic inspectional and correctional program with coincident education of the public should gradually increase in effectiveness so that dengue may possibly be eliminated from Honolulu without the entire population's being subjected to the painful and costly process of developing a temporary immunity to the disease. (Pub. Health Rep., Mar. 31, '44.) (D.F.S.)

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Large Doses of Vitamin K Antidote for Dicumarol: In an item on anticoagulant therapy in the Bumed News Letter of April 14, 1944, the following

statement appears: "The action of dicumarol in prolonging the prothrombin time cannot be promptly reversed by the administration of vitamin K, but can be modified by transfusion of whole blood." This statement represented the consensus of the many workers whose papers were reviewed in the preparation of that item.

Davidson and MacDonald reported (New England J. Med., Aug. 26, '43.) that by the intravenous administration of large doses of a special preparation of vitamin K_1 oxide they were able to reverse to normal in three out of their four cases the prolonged prothrombin time induced by dicumarol. This work was not mentioned in the News Letter item because of lack of confirmation and the small number of cases involved. Previously, Shapiro, Redish and Campbell had found that in human beings large amounts of menadione* given by mouth and intramuscularly prevented prolongation of the prothrombin time following administration of dicumarol.

Cromer and Barker (Proc. Staff Meet. Mayo Clin., May 3, '44) have recently confirmed the work of Davidson and MacDonald and pointed out that the doses of vitamin K previously used by most workers to counteract the action of dicumarol had been too small. These investigators administered menadione bisulfite, usually in a single dose of 64 mg., intravenously, to thirty-seven patients who had developed an excessive deficiency of prothrombin after administration of dicumarol. All but two patients responded satisfactorily to administration of menadione bisulfite. The response was classified as satisfactory when the prothrombin time fell to within what are considered to be safe limits. In three cases the reduction of prothrombin time was not great. In the remaining thirty-two cases a marked and relatively rapid lowering of prothrombin time occurred. No toxic or untoward reactions followed administration of the menadione bisulfite.

Bleeding, which had occurred in three cases after administration of dicumarol, ceased after administration of menadione bisulfite in two cases and after menadione bisulfite and a blood transfusion in the third case.

It was found that a definite lowering of prothrombin time began within two hours and that its minimum was reached in about eighteen hours. In almost all cases the lowering of prothrombin time produced by menadione bisulfite persisted until more dicumarol was given.

Cromer and Barker believe that the administration of menadione bisulfite intravenously in doses of 64 mg. to patients who exhibit excessive deficiency of prothrombin after administration of the usual doses of dicumarol will serve definitely to make dicumarol therapy more safe.

*Menadione (N.N.R.), name accepted by Council on Pharmacy and Chemistry of American Medical Association for 2-methyl-4-naphthoquinone, a synthetic naphthoquinone having physiological properties of vitamin K.

The Crush Syndrome: Bywaters in a recent paper summarizes his experience with "crushing injury."

Patients with this type of trauma frequently give a history of burial beneath debris for several hours, often with compression of a limb by fallen masonry. Usually the patient will say that the limb was at first very painful and then numb. On examination - as soon as the grime and plaster are cleared away - patches of erythematous skin are seen delineating accurately the area of compression. The erythematous areas may progress to blister formation. Soon after release from compression, the affected limb becomes swollen and hard; there is, at first, no subcutaneous pitting edema, as the fluid is almost entirely beneath the deep fascia. The affected muscle is insensitive and paralyzed; superficial skin sensation is lost, usually in a rather patchy distribution. Later the tenderness passes off, palpation elicits a peculiar "doughy" sensation and pitting edema may appear.

The general condition of the patient may at first give rise to no concern; the blood pressure is often normal or slightly raised. Within a few hours, however, in patients with extensive lesions (one leg and thigh or more), the damaged area swells and the blood volume is correspondingly reduced by plasma leakage into the extravascular tissue spaces of the injured part. Symptoms and signs of shock supervene, and the development of shock will be accelerated if the patient is warmed. Shock in these cases is usually distinguished by striking hemoconcentration with hemoglobin levels as high as 19 to 22 Gm. per 100 c.c. of blood.

In some patients, as the swelling in the limb increases, the distal pulse decreases and the foot or hand becomes pale and cold. Oscillometric readings confirm the presence of ischemia. In some cases the blood flow returns spontaneously. In others, if the surgeon makes an incision along the course of the artery, much serous fluid seeps from the wound and pale necrotic muscle bulges out. Obviously there has been a great increase of tension locally, which has perhaps obliterated the venous return. Following this procedure, in some patients a pulse is restored distally; in others the artery is found to be in spasm and periarterial stripping may be thought necessary.

The first urine passed after admission is usually highly acid (pH as low as 4.6) and shows a brown sediment of acid hematin granules. Usually, the supernatant urine is of a smoky color; only in urines with a pH approaching neutrality is the color red, and in such urine there is usually little or no sediment. Within one or two days the excretion of pigment ceases; casts become more numerous. The amount of urine excreted decreases progressively in severe cases until the end of the first week. Its composition tends to resemble glomerular filtrate in that the concentration of urea is low - often below 1 Gm. per 100 c.c. with a blood level of over 300 mg. per 100 c.c. - and the chloride content tends to be high despite a blood concentration below the normal

level. Reducing substances are occasionally found in small amounts. Thus there is evidence of severe tubular dysfunction. Other substances present in abnormal quantities in the urine are potassium and creatine.

Nitrogen retention occurs with the symptoms characteristic of uremia. The serum carbon dioxide combining power may be low soon after release from compression, as a result probably of the liberation of lactic and other acids from the damaged muscle, but rises thereafter; in cases with excretory impairment the carbon dioxide combining power may show a late tendency to fall, as the result of retention of acid. The blood pressure progressively rises to levels between 150 and 200 mm. of mercury and is maintained until death or the recovery diuresis ensues.

About one-third of the cases ordinarily recognized, especially those with a lesser degree of muscle destruction, go on to recovery, the evidences of impairment in renal function being brief and of mild degree. These patients are left with unimpaired renal function and some slight weakness in the affected muscle. In the more severe cases there are oliguria and severely decreased urinary urea concentration, with a blood urea as high as 400 to 500 mg. per 100 c.c. In those that recover at the critical period on the sixth or seventh day, a diuresis begins and is maintained for several days until all the retained nitrogen is excreted. At the same time the raised blood pressure begins to fall to normal. Renal function, however, although it appears to recover completely, does so slowly. It may take five months for the urea clearance to reach normal figures. Damage to the compressed muscle is never completely repaired if complete ischemic necrosis has occurred. The infarct is replaced by fibrous tissue; calcification sometimes occurs. Fibrosis may result in a Volkmann's contracture: it is important, therefore, to splint the limb correctly.

Two-thirds of the patients die toward the end of the first week, the majority on the sixth day. If electrocardiographic tracings are taken, changes similar to those encountered in human potassium poisoning are seen - increased T waves and widened QRS complexes. These are associated with an increase of the potassium level in the serum to more than twice the normal upper level of 20 mg. per 100 c.c. The raised serum potassium concentration is due to diffusion of potassium into the blood from the damaged muscle and to diminution in its excretion owing to the renal failure.

Pathologically, the kidneys resemble those of renal failure following intravascular hemolysis, being swollen and tense, with foci of tubular necrosis most pronounced in the distal convoluted tubule, and showing pigmented casts from the distal convoluted tubule downward.

The pigment in the urine is found by spectroscopic analysis to be myohemoglobin, the intracellular hem- compound responsible for oxygen storage in muscle. Since it has a molecular weight of 16,700 as compared with 68,000 for hemoglobin, it is filtered out through the glomerulus as rapidly as it is taken up from the muscles.

In a certain number of patients the crush syndrome is present without evidence of crushing injury to muscles. These patients usually have necrosis of muscle secondary to interruption of its blood supply as the result of arterial spasm, rupture, thrombosis or obstruction.

The author has analyzed necrotic muscle from crushing injury. Compared with undamaged muscle from the same corpse, it has lost 75 per cent of its pigment, 75 per cent of its phosphorus, 66 per cent of its potassium, 70 per cent of its creatine and 95 per cent of its acid-producing substances (glycogen, etc.).

Experiments with animals suggest that the renal damage may be caused principally by myohemoglobin. While mechanical blockage of the tubules may play a small part, it seems probable from some preliminary experiments that myohemoglobin (in rabbits) with acid urine acts in a more direct way on the tubules, perhaps by producing a physiologic (resorption) blockage with rapid rise in intrarenal pressure. It is not certain, however, that the conclusions drawn from these experiments in animals apply to the mechanism of renal injury in man, as the lesions produced in the rabbit's kidney by injection of myohemoglobin are not exactly similar to the lesions seen in the human kidney following crushing injury.

Treatment:

1. Administration of Fluid and Alkali: Bywaters recommends as the first and most urgent step an attempt to guard against renal failure by the establishment of an alkaline urine. One should, if possible, give sodium bicarbonate and fluids by mouth before release from compression of patients buried for one to two hours or more; if necessary, release should be delayed for twenty to thirty minutes to allow this to be done. It seems probable, however, that most patients will not have had this alkali and fluid given before they enter the hospital, in which event they should there be given sodium bicarbonate or other mild alkali 4.0 Gm. hourly by mouth until the urine is alkaline. The alkali should then be continued over the next two days to maintain alkalinity of the urine. Should vomiting preclude oral administration, or if it is desired to alkalize the urine within two hours, isotonic sodium lactate solution, 3 to 4 per cent sodium citrate solution, or sodium bicarbonate 1.4 per cent solution may be given intravenously. This alkalization,to be effective,should be early and thorough, being

controlled by the reaction of the urine. A fluid intake of at least three liters daily should be assured, either by mouth or by vein. The volume of the 24-hour urine must be measured.

2. Treatment of Shock: This should accompany hydration and alkalization. The patient may be leaking plasma into the injured area, sometimes without outward sign if the trunk is affected. Since renal function is likely to be further impaired by a fall in blood pressure, it is important that this "pre-shock" stage should be recognized and prompt treatment instituted. Plasma should be given before the blood pressure falls - in the stage of hemoconcentration. Blood may be necessary if hemorrhage has occurred. Morphine should be given for pain. The patient should not be heated, unless he is uncomfortably cold, and then blankets will probably be sufficient.

3. Local Treatment: The injured limb should be kept cool with ice bags. Immobilization may prove a useful measure. If circulatory obstruction should occur, fascia-splitting incisions may be made along the course of the main limb vessels once the urine has been rendered alkaline. Plaster casts may be applied after splitting the fascia but not before (unless they are bivalved). If obstruction is due to arterial spasm, this may be relieved by stripping or resection of the damaged portion of the vessel. Amputation should be done only if the leg is so severely damaged as to be useless, and then in the first twenty-four hours.

4. Treatment of Cases With Established Renal Failure: Some patients with very severe lesions and high blood urea levels have recovered without any treatment other than bed rest. The results of any treatment must therefore be viewed with a critical eye. (Ischemic Muscle Necrosis, Bywaters, J.A.M.A., April 15, '44.)

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The study of patients suffering from crushing injury has given impetus to investigative work directed toward the isolation from damaged muscle of substances capable of producing shock or of injuring the kidney.

Green reported the isolation of a shock-producing substance that could be extracted from fresh voluntary muscles of various animals. It is rapidly destroyed in the muscle after death. Injected intravenously or intramuscularly into other animals it has a powerful shock-like effect, the resulting clinical picture being like that produced in animals after release of occlusion by tourniquets of the circulation to the hind limbs. Chemical analysis of the shock-producing factor derived from muscle has led to the conclusion that adenosine triphosphate is the substance responsible for its action. Animals injected with enough of the muscle extract experience anuria. The

urine of some contains albumin, granular casts and occasional red cells, but rarely is there hematuria. In the fatal cases nitrogen retention occurs. Even minute doses when injected into the cat produce vasoconstriction. However, while the kidneys are edematous when examined at autopsy, direct histopathological evidence of renal damage is hard to find. Of particular interest, however, is the fact that when myohemoglobin is injected practically simultaneously with the extract of fresh muscle, the changes in renal physiology are quantitatively increased, and the renal histopathological picture of the crush syndrome is reproduced. (Lancet, Aug. 7, '43.)

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Recent experiments conducted by Van Slyke and others have emphasized the fact that in shock the renal blood flow almost stops. This is probably due to a renal vasoconstriction the purpose of which is protective of the higher centers whose oxygen supply is threatened by the falling blood volume. Studies of renal blood flow were made using the excretion of para-amino hippurate as an index. This substance is almost quantitatively excreted by the tubules and gives results similar to those obtained with diodrast. Renal damage has been demonstrated in dogs resuscitated following severe shock. The degree of renal damage varies with the duration of the renal ischemia. In the dog, renal ischemia of more than four hours' duration will produce irreversible renal damage and subsequent fatal uremia. The histological picture of the kidney seen in the "crush syndrome" in man has been duplicated in dogs by producing renal ischemia (produced by clamping the renal artery or by severe shock) and at the same time introducing a solution of hemoglobin.

These workers believe that the damage produced by the renal ischemia that occurs in prolonged shock provides an explanation for the delayed uremia noted in the "crush syndrome" and in wounded men in whom restoration of lost blood has been delayed for several hours. It also accounts for the uremia that occurs when patients with diabetic coma, dysentery and cholera develop shock.

Studies are now being undertaken in the hope ot finding a form of therapy that will ameliorate this type of renal failure. Initial studies with sodium bicarbonate are encouraging.

(From Report of Studies on Shock, Particularly in Relation to the Derangements of Renal Physiology Associated with This Condition, March 1942 to March 1944, The United States Naval Research Unit at the Hospital of the Rockefeller Institute for Medical Research, New York, N. Y.)

* * *

Bing has recently reported some interesting experiments in which he attempted to produce renal injury in dogs by parenteral administration of hemoglobin, myohemoglobin and methemoglobin.

He found that intravenous infusions of myoglobin and hemoglobin into dogs rendered acidotic with ammonium chloride and of methemoglobin and hemoglobin into normal animals failed to produce renal failure.

On the other hand, infusions of crystalline methemoglobin into acidotic dogs was followed by a fall in the effective renal plasma flow, glomerular filtration rate and the tubular reabsorptive capacity for glucose.

The renal lesion in acidotic dogs infused with methemoglobin consisted of hydropic degeneration of the proximal convoluted tubules, cellular necroses in the distal segment and plugging of the collecting tubules with hyaline and in some instances with pigmented casts. Dilatation of the collecting tubules and glomerular damage were absent. Acidosis produced by oral administration of ammonium chloride had no effect on the renal function. (Bull. Johns Hopkins Hosp., Mar. '44.)

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While these studies add considerably to our knowledge of the mechanism of traumatic shock, they do not make it seem any simpler. The significance in the production of shock, on the one hand, of loss of plasma directly into the injured tissues with consequent fall in blood volume and, on the other, of possibly toxic substances such as adenosine triphosphate and potassium derived from muscle and acting on the circulation, is not clear. It is apparent that irreparable damage may be done to the kidney by the renal ischemia consequent to the state of shock. Further damage may be superimposed as a result of the excretion of myoglobin.

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Care of the Electrocardiograph Machine on Shipboard: It is well known to those stationed in the tropics or on duty at sea that deterioration of equipment can be prevented or retarded by keeping it in lockers where an electric light bulb is kept burning continuously. Lt. Comdr. L. H. Hoyt called our attention to the application of this principle in the care of the electrocardiograph, to prevent corrosion of the terminals and consequent interference with the efficient working of the machine.

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Difficulties in Administration of Fluids Intravenously Due to Motion of a Ship: While serving on a hospital ship during the evacuation of a large number of recent casualties, Lt. Comdr. Hoyt noticed that while the ship was under way, intravenous solutions from closed containers did not run well into veins. It was considered advisable in certain instances to replace the closed container with an open-top intravenous set, thereby achieving more rapid flow. It is

possible that the motion of the ship produces alterations in pressure, inasmuch as the flow definitely decreased when the ship pitched or rolled. He suggests, also, introducing a little positive pressure to increase the flow.

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This suggestion was referred to Capt. L. R. Newhouser. He believes (1) that the pitching and rolling of a ship may occasion pressure changes which will interfere with the gravity flow of intravenous solutions, and (2) that, provided the intravenous injection is properly supervised, there is no objection to the application of slight positive pressure by means of a suitable bulb, thus assuring the flow of the solution. For reasons of sterility the use of positive pressure with the closed method, introducing an air filter, is probably preferable to substituting the open method.

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Immersion Blast Injuries: Lt. Comdr. E. Lyle Gage has recently submitted to the Bureau a detailed report with respect to a number of survivors of the sinking of a naval vessel who were exposed to blast injury from the explosion of a 300-pound depth charge. The report is of interest not only because it presents a remarkably careful description of all of the circumstances of the disaster, as well as of the clinical course and therapy of the survivors, but also because it includes the author's critical analysis of the important factors involved in the prevention and treatment of men who have been injured by underwater blast.

The following passages are taken from the summary of the report:

The majority of the men wore rubber life belts. However, of sixty-two such belts, eighteen burst, three leaked and six were lost, possibly because of bursting and becoming loose. Thus 44.6 per cent of the rubber life belts were rendered partially or totally useless. Other men may be missing because the life belts failed to support them. Of the twenty-four Kapok belts, only one was lost and all of the others did their duty. It is hard to say whether either the Kapok or rubber belt afforded much protection, although the man whose belt burst gave no evidence of perforation of a viscus but had a rigid abdomen with probable hemorrhage in the wall. One patient who had X-ray evidence of free gas in the peritoneal cavity, developed a suprapubic abscess and had a small fecal fistula, also had a bruise on the abdominal wall which was made by the buckle of his life belt. He noted the bump from the buckle at the time of the depth charge blast, yet his rubber belt did not burst. From the reports of these men one would incline toward the use of the Kapok jacket instead of the rubber belt, because the former would seem to offer more reliable protection.

The majority of the men swallowed water, and some of the vomiting and bowel movements recorded as occurring in the water may well have been due to this factor. No evidence was obtained that water entered the rectum. Interestingly enough, there were only five men with severe injury whose bowels moved in the water, as compared with twenty-one with minor injury.

Records of the position in the water when the depth blast went off show thirty-eight men on the abdomen, with thirteen severe and twenty-five minor injuries, as compared with fifty-two in other positions with ten serious and forty-two minor injuries. However, a study of the severe abdominal injuries shows that all of these patients were on the abdomen, were completely submerged, or were submerged to above the level of the abdomen and facing the blast when the depth charge exploded. Sixty-six complained of pain as a result of the blast, and of these, forty-nine had pain in the abdomen. This preponderance of abdominal pain as well as of abdominal injuries is worthy of re-emphasis in considering immersion blast injury to personnel. Men should be advised to swim on the back. It would seem that if men in the water could be aided by floats attached to shoes or leggings to assist in keeping the legs up and the abdomen out of the water while floating on the back, it might help reduce the incidence of immersion blast injury. (A simple pneumatic float is easily improvised by knotting trouser legs or shirt sleeves and filling the wet garment with air by flipping it over and imprisoning the air as one submerges it. Ed.)

One patient who did not have pain coughed up blood; three felt pain in both chest and abdomen. Four patients complained of pain in the testicles but none of these had swelling, ecchymosis, hematuria or discharge, and the pain had subsided by the time they were admitted to the dispensary. Four patients complained of transitory numbness or paralysis in the legs, which subsided promptly. None had residual abnormal neurological signs on admission.

We find that eighty-one of the ninety received food or drink aboard the rescue craft and forty-six were allowed activity such as walking about, taking a shower, etc. It would seem necessary to re-emphasize the advisability of allowing no food or activity for personnel rescued after immersion blast until careful evaluation of their condition has been made by a medical officer.

These patients were received thirty-six hours after injury, and we consequently set our course along conservative rather than immediately operative lines. The four patients who died were at no time in condition for operation, despite the maintenance of fair blood pressure until moribund. We are convinced that any operative procedure would have hurried death. On the other hand, all of the others who were treated conservatively lived, and had we received them with the same symptoms within ten or twelve hours after the depth charge explosion, we might have felt, perhaps, that we must operate upon at

least sixteen or seventeen of them. Two who had free gas in the peritoneal cavity (shown by X-ray) as positive evidence of a ruptured viscus recovered rapidly and developed no abdominal nor pelvic mass. Two patients showed clinical evidence of secondary perforation of a viscus, even after prolonged rest in bed. One of these perforations occurred after a walk forty days after injury. The one man who was operated upon promptly recovered, and it is the surgeon's opinion that the operation saved his life. Yet the X-ray failed to show free gas in the peritoneal cavity; the perforated area was walled off at operation; and after comparing him with some of the patients treated conservatively, we are inclined to feel that he too might have recovered, even without the operation, with the excellent supportive treatment alone which he received. This does not mean that our premise is that immersion blast injuries with perforation, rescued early, should not be operated upon. We would re-emphasize that, in cases like these in whom the optimum period for operation has passed, non-operative treatment such as was used can save many lives. A study of the autopsy findings confirms our belief that the patients with immersion blast injuries can recover with conservative treatment if the initial damage is not so great as completely to overwhelm them in a short time.

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Untoward Effects of Various Substances Recommended for Burns or Wounds; Experimental Tests on Rats: In studies reported by Baker, various substances which have been applied to human burns and wounds were utilized on rats as test animals and their local and general effects noted. No necrotizing effect on the exposed muscle of the rat's abdominal wall was seen when nothing or when isotonic solution of sodium chloride, petrolatum, boric acid ointment or motor oil (Esso No. 3) was applied.

White soap, ether and benzene had a minimal but definite necrotizing effect, involving the superficial muscle fiber layer; while hexylresorcinol, solution of hydrogen peroxide U.S.P. (half strength), medicinal soft soap U.S.P. (50 per cent aqueous) and alcohol (95 per cent) produced a more pronounced necrosis involving the superficial 2 to 3.5 layers of muscle fibers. Tannic acid 10 per cent, silver nitrate 10 per cent, mixtures of tannic acid and silver nitrate, and "triple dye" were extremely damaging to rat muscle, to a depth of six to nine layers of muscle fibers.

Absorption of certain of these substances by the large ventral areas denuded of skin was sufficient to cause death; specifically, alcohol (95 per cent), causing acute alcoholism, and solution of hydrogen peroxide U.S.P. (half strength), causing gaseous cardiac embolism. The absorption of benzene caused muscle tremors. Lethal anesthesia resulted if the rats breathed any great quantity of the benzene. Absorbed tannic acid produced hepatic necrosis.

These results indicate possible untoward effects of various substances which have been employed as therapeutic agents or as detergents on human burns or in wounds.

On the basis of these tests on rats, detergents should be avoided, but if they must be used, white soap and ether are the least objectionable of those tested. White soap has the advantage, in comparison with ether, that it is not inflammable. (Arch. Surg., April, '44.)

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Rocky Mountain Spotted Fever: In the continental United States the vernal renascence of interest in Rocky Mountain spotted fever has occurred and it may be well again to call attention to the progress that has been made in the prevention and therapy of this disease.

In the Rocky Mountain region the causative agent of spotted fever (Rickettsia rickettsi) is transmitted by the tick, Dermacentor andersoni, which appears in March and persists until late June. In the eastern part of the United States, Dermacentor variabilis is the vector. This species appears in April and persists until late August or early September. The seasonal incidence of the disease in each area corresponds to that of the tick vector.

During the years 1939, 1940 and 1941, the annual incidence of the disease averaged a little over 500 cases. These cases were reported from 41 states, the exceptions being Maine, Vermont, New Hampshire, Rhode Island, Wisconsin and Michigan.

The rickettsiae of spotted fever are very numerous in the feces of the fed tick as well as in the intestinal mass of ingested blood. Contact with either of these may infect through the unbroken skin in the absence of an actual bite. Spencer and Parker many years ago demonstrated a transition in the virus from a non-virulent to a virulent stage, as the tick fed. This phenomenon provides an explanation of the fact, first demonstrated by Ricketts, that ticks do not infect unless attached for some hours.

The incubation period varies from four to twelve days. The onset is usually sudden and characterized by chill or chilly sensations, headache, photophobia, muscle and joint pains and rapidly rising temperature. The rash usually appears after three to four days. It is usually seen first on the flexor surfaces of the wrists and about the ankles. Early it is maculopapular in character, pink to red in color, circumscribed,with normal intervening skin, each lesion measuring about 2 to 4 mm. in diameter. Within 24 to 48 hours this maculopapular rash extends to involve most of the body including the face, scalp and palms of the hands and soles of the feet - and at its height the

buccal mucosa and soft palate. As the disease progresses, the rash becomes dusky in appearance, frequently petechial and occasionally purpuric with coalescence of the lesions.

Death most often occurs between the seventh and tenth days, often with symptoms suggestive of cardiac failure. Otherwise the patient goes on to recovery, the disease terminating usually between the sixteenth and twenty-first day by slow lysis. The fatality rate is about 18 per cent.

The pathology of the disease includes, grossly, enlargement of the spleen, which is of dark reddish color, small hemorrhagic areas in the mucosa of the intestines, and not infrequently a bronchopneumonia, which may be secondary, with dark reddish wet lungs. Microscopically there are found widespread lesions consisting of thrombonecroses of the small arterioles and capillaries, particularly of the skin, heart, kidney and brain. Micro-infarcts are frequently seen, as well as cuffing of the small vessels with collections of round cells, usually lymphocytes. Intracellular clusters of rickettsiae are often found in swollen endothelial and vascular adventitial cells of the swollen blood vessels of the skin, lymph nodes, brain and other organs.

Laboratory findings of a specific nature occur so late in the disease as to be of little help to the clinician. Three procedures have been used for a number of years to assist in the diagnosis of Rocky Mountain spotted fever. Two of these - the animal inoculation and the animal protection tests - require a considerable time for completion and few institutions have the facilities for carrying them out. The third test, the Weil-Felix reaction (agglutination of certain Proteus X strains by patients' sera), is easy to perform and is positive in most cases of spotted fever after about the tenth day. However, it will not differentiate between spotted fever and typhus.

A new test which perhaps may be of even greater value is the complement fixation test using the specific antigen of Rocky Mountain spotted fever. This procedure, if carefully done, will differentiate typhus from spotted fever in most instances. It becomes positive about the same time as the Weil-Felix test but is maintained in high titer for a longer period of time, perhaps even years.

Recently an immune serum has been produced in rabbits by the use of live virus, either from infected ticks or infected yolk sacs, as the antigen. While the results of human trial are not conclusive, mainly because of the small number of cases treated, data have been accumulated which indicate that the fatality rate in those cases treated before the third day of rash was considerably below that expected from past experience with patients receiving no serum. In a series of 52 cases treated by Topping there were only two deaths, both in patients over 65 years of age.

Treatment otherwise consists of the usual supportive measures. Intravenous fluids should be given with caution, if at all, because of the danger of cardiac insufficiency.

Prophylaxis against Rocky Mountain spotted fever can be obtained through the use of a vaccine prepared by phenolization of infected tick tissues. Experience with this vaccine over a period of some 15 years indicates that the case fatality is definitely reduced and perhaps the morbidity as well. In view of the low incidence of the disease the vaccine should be given only to those working in an area where there is a very high incidence of infected ticks.

Recently, interest has been aroused in the possibility of preventing the disease by injecting the immune rabbit serum at the site of the bite of the infected tick. This work has been carried out in experimental animals. Its application to human cases is doubtful, especially when it is considered that the estimated ratio of infected to non-infected ticks, even in heavily infected areas, is not more than 1:300.

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BIBLIOGRAPHY: 1. Topping, N. H., M. Clin. North America, May 1943.
2. Idem., Pub. Health Rep., May 14, 1943.

Note: The vaccine can be secured from State Health Departments, from the National Institute of Health, Bethesda, Maryland, or from the Rocky Mountain Laboratory of the Public Health Service at Hamilton, Montana. More recently vaccine is being prepared from the yolk-sacs of infected fertile hens' eggs, and this type of vaccine is commercially available (Lederle).

The immune serum is manufactured by Lederle and by Sharp and Dohme and is commercially available. An emergency supply to be used in urgent cases is kept at the National Institute of Health and at the Rocky Mountain Laboratory.

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Specimens for Toxicological Examination Submitted to the Naval Medical School, Revised Directions for: A complete copy of the medical history and medical abstract sheets from the individual's health record shall be forwarded with any specimens submitted for toxicological examination. If an autopsy was performed, the findings will be included.

The following outline shall serve as a guide when submitting samples for examination:

I. CONTAINERS: Select wide mouth, glass jars. (The use of zinc-capped, Mason jars is FORBIDDEN.) Metal of any kind must not come in contact with

material being forwarded. The glass containers in which SOFT SOAP is supplied are excellent, provided they have plastic tops. Wash thoroughly with soap and water the containers selected; rinse them with concentrated nitric acid, tap water and finally three times with distilled water. When well drained, or, if time permits, oven-dried, the containers are ready for use.

II. MATERIAL: Submit at least the following: Stomach and contents; intestines, containing contents, about two feet; urine remaining in bladder; liver - 300 grams; kidney - 200 grams. If carbon monoxide, cyanide or other blood poisons are suspected, include a 50-cubic centimeter sample of citrated blood.

III. PRESERVATION: Weigh each organ separately (measure if liquid) and place in separate jar. Record the weight or volume. For each three parts of tissue or liquid add one part of sodium chloride (the dry salt) carefully weighed. Record on the label the name of the organ or liquid, its weight and the weight of the sodium chloride added. Seal the cap on the container in such a manner that any tampering with it will be easily apparent. Citrated blood is to be unpreserved. A sample of about 200 grams of the same sodium chloride used to preserve the specimens is to be submitted. U.S.P. grade sodium chloride is preferable. The samples should be preserved with the same lot number sodium chloride as that sent separately.

IV. Certain cases will require material in addition to that listed in paragraph II. Reference to a standard work on toxicology will assist in the selection of proper material. When doubt exists as to the exact material or the quantity of material to forward, a letter giving the history of the case and the kind and extent of examination wanted should be addressed to: Commanding Officer, Naval Medical School, National Naval Medical Center, Bethesda 14, Maryland. (P.W.W.)

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Scalenus Anticus Syndrome: Judovich et al. in a recent paper discuss the symptoms and signs which are associated with the scalenus anticus syndrome, and describe a technic of infiltration of the scalenus anticus muscle with procaine.

The anterior scalene muscle arises from the anterior portion of the transverse processes of the third, fourth, fifth and sixth cervical vertebrae. It courses almost directly downward to be inserted at the scalene tubercle on the upper inner surface of the first rib. It is situated behind the subclavian vein and in front of the subclavian artery. The subclavian artery thus lies within the acute angle formed by the scalenus anticus muscle and first rib. The subclavian vein lies in front of the muscle and in the space between the first rib and the clavicle.

The trunks of the brachial plexus and the cervical sympathetic chain lie behind the medial surface of the muscle. At each level from the third to the sixth cervical segment a branch is supplied to innervate the muscle.

Thus, conditions which cause spasm or hypertrophy of the anterior scalenus muscle may cause pain by irritating: (1) the subclavian artery, (2) the brachial plexus, (3) the subclavian vein, and (4) the cervical sympathetics, or the vascular sympathetic fibers. Any of these structures may be irritated singly or in combination, often producing a mixed and confusing picture of pain and tenderness in the the upper extremity. Narrowing of the costoclavicular space may also produce symptoms of vascular compression.

A spastic or hypertrophied scalenus muscle may narrow the acute angle formed by the muscle and the first rib. Since the subclavian artery lies within this angle, it may be compressed, producing severe pain in the upper extremity. The hand and fingers may be cooler than those of the unaffected side. Oscillometric readings of the brachial artery show a diminished excursion as compared to the non-painful side. The patient complains of a dull heavy arm, as though a weight were placed upon it, or perhaps a severe cramp-like ache. Often there is an associated sensation of numbness and tingling. The strength of the hand clasp is usually weakened.

As a result of irritation of the brachial plexus, there may be demonstrable areas of segmental nerve tenderness associated with pain. These findings may be combined with symptoms denoting compression of the brachial artery. Tenderness in the fourth, fifth and sixth cervical nerve distributions may be defined. Irritation of the fourth cervical nerve produces pain over the upper half of the scapular region and in the anterior chest wall down as far as the fourth rib. With involvement in the fifth cervical distribution, pain and tenderness are limited to the middle third of the upper arm. The sixth cervical dermatome when affected produces pain down the arm to and including the thumb.

The subclavian vein is not often affected, but when compressed there may be a neuralgic ache of the arm, extending to the fingers, areas of hyperesthesia, and a sensation of fullness in the fingers. The fingers may be thickened and the phalangeal joints tender. The skin surface temperature may be increased on the affected side.

Finally, as a result of irritation of the sympathetic nerves, there may be pain and vasomotor instability of the upper extremity.

A reliable diagnostic sign is the comparison of pressure effects upon the scalenus muscles of the non-painful and of the painful side. The head should be held backward and tilted away from the painful side so that palpation

of the scalenus muscle will be facilitated. At the same time, the thumb, placed about an inch above the clavicle, forces the posterior border of the sternocleidomastoid muscle medially. Pressure upon the scalenus muscle of the non-painful side should be firm and maintained for a full minute. Comparison with the painful side is then made. In all cases, the tenderness is much greater on the affected side and the continued pressure intensifies the pain and distress. Forcing the head back and away from the affected side tightens the scalenus muscle and increases the pain.

The authors believe that a diagnostic procaine infiltration of the scalenus anticus muscle is the most dependable test for the presence or absence of this syndrome. It has been stated by others that the development of Horner's syndrome frequently follows such an injection. Judovich et al. think that this is the result either of injecting too much procaine or of not injecting it directly into the muscle.

The technic of injection is described as follows: The patient's head is brought over to the painful side to relax the sternocleidomastoid muscle. Just above the clavicle, the sternocleidomastoid muscle is pushed medially, at the same time forcing the fingers inward and downward. At this moment the head is pressed to the opposite side and retracted. This causes the scalenus muscle, which at this level is just behind the posterior border of the sternocleidomastoid muscle, to become palpable so that it may be straddled by two fingers. After locating and straddling the muscle, the fingers are pushed down firmly, causing the muscle to bulge between the fingers. A 3/8 inch hypo-needle is inserted between the fingers, directly into the belly of the muscle; 2 c.c. of 2 per cent procaine are injected.

The authors have found that complete relief of excruciating pain may take place within one minute following the injection. If no relief is obtained within three minutes, they regard the test as negative.

If the patient obtains immediate relief of pain under the conditions specified, and the pain returns in a half hour or more, it is still regarded as a positive test. Fifty per cent of patients with a scalenus anticus syndrome will obtain clinical relief of pain by repeated infiltration. This is a higher percentage than had been reported previously.

If three or four successive injections cause immediate relief, indicating a positive test, and on each occasion the pain returns with its former severity, the muscle should be surgically sectioned.

Patients who show continued improvement with successive infiltrations should continue with this therapy. If progress becomes stationary and the amount of residual pain warrants it, the muscle should be cut. (Am. J. Surg., Mar. '44.)

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This item was referred to Commander F. P. Kreuz (MC), USN, for comment. He replied as follows:

"The implications of the factors involved in the production of varied symptoms and signs by muscle spasm and hypertrophy bring up a fundamental issue in orthopedics which, if carried to its full conclusion, would shed a different light on many of our problems. For instance, if we accept as a fact the premise that muscle spasm or hypertrophy causes irritation or compression of contigual anatomical structures, and thus produces symptoms or signs characteristic of irritation or compression of these structures in the case of the scalenus anticus muscle, we must accept the same also in the case of the pyriformis muscle, the iliopsoas and erector spinae muscles, the trapezius, cervical muscles, etc. The actual mechanism of the production of the various symptom-complexes is, however, not yet clearly defined. Vascular spasm, reflex muscle spasm, and tense fascial planes all play a part.

"The authors describe the symptom-complex of scalenus anticus syndrome very well, but I wish they had enlarged on their text at least to include the scalenus anticus-like syndromes which we see so often, e.g., the supraspinatus and shoulder bursae syndromes. In the latter, there is often a neuralgic and vascular component, and it is particularly confusing if there is an accompanying secondary neck-muscle spasm. A word of caution might also be included to avoid unnecessary injections of and operative interference with the scalenus anticus muscle. Many cases of temporary collapse of the diaphragm have been reported from sectioning the muscle, supposedly due either to operative trauma to the phrenic nerve or to stretching of the nerve from the effects of retraction of the cut muscle. Insufficient evidence of the effects of injection on the phrenic nerve is available to permit a statement in this regard.

"I believe that in every case of scalenus anticus or scalenus anticus-like syndrome an effort should be made to make an etiological diagnosis so that proper conservative measures may be instituted. A doctor's wife recently reported to me with a severe typical scalenus anticus syndrome due to carrying a twenty-pound, eight-month-old baby almost continuously during a trip across country. All symptoms subsided in forty-eight hours with no treatment except transferring the offspring to the arms of the reluctant husband.

"Local heat (infra-red and diathermy) and muscle massage, or mere elevation of the extremity, often give relief. Immobilization of the neck in a chest spica with the extremity elevated and the neck bent toward the injured side should also be tried before sectioning of the muscle is decided upon. Scalenus anticus syndrome is sometimes associated with the presence of a cervical rib, in which case it may be necessary to excise the rib. X-ray treatment is indicated in those cases in which the muscle spasm is due to Hodgkin's cervical adenitis. It is surprising how often a single 'shoulder cuff' injection for the

supraspinatus and bursae syndromes will give instand and, occasionally, permanent relief for the scalenus anticus syndrome. In our experience this has occurred so frequently as to make one wonder whether many cases of so-called scalenus anticus muscle spasm are not actually secondary to a shoulder condition. In the 'shoulder cuff' injection the needle is inserted in the direction of the upper end of the bicipital groove just medial to the greater tuberosity (about 1-1/2 inches below the acromio-clavicular joint). This point can be readily felt by the palpating finger and is always tender to pressure in cases where the injection is indicated. About 10 c.c. of 1/2 or 1 per cent procaine is used. A small amount is first injected under the transverse ligament, the needle is then retracted slightly and the region of the supraspinatus attachment and bursae infiltrated. Relief of symptoms is almost instantaneous, even in the scalenus anticus-like syndromes with sympathetic, circulatory, and neuralgic manifestations in the arm and hand. The neuralgic manifestations are often predominantly ulnar-nerve and may be associated with a decrease in the strength of the hand grip, puffiness of the hand, paresthesias and decrease in the action of the intrinsic muscles of the hand. How all these symptoms are immediately relieved by the shoulder injection is difficult to explain."

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Examination for Appointment in the Dental Corps, Regular Navy: To give the large number of reserve officers an opportunity to enter the regular service, a competitive examination for appointment in the Dental Corps, U.S. Navy, will be given October 16, 1944, at the Naval Training Station, Norfolk, Virginia; the Naval Training Center, Great Lakes, Illinois; the Naval Training Center, San Diego, California; and the Naval Dental School, National Naval Medical Center, Bethesda, Maryland.

Applicants must have been under thirty-two years of age upon first reporting for active duty in the Navy.

A circular of information may be obtained from the Bureau of Medicine and Surgery upon request. (R.S.D.)

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Reports on Research Projects at the Naval Medical Research Institute Available for Medical Officers:

X-110 Sterilization of Individual Water Supplies (Canteens) II. The Practicability and Effectiveness of Potassium Permanganate/Iodide/Iodate and Citric Acid Mixture, Report #2.
Summary: 1. Seven lots of tablets containing mixtures of potassium permanganate, iodide, iodate, and citric acid were

manufactured for the Naval Medical Research Institute by Burroughs Wellcome and Company (U.S.A.) Inc., and numerous batches of the powdered mixture were compounded in the laboratory. Of all these, the most practicable and effective was a mixture of the reagents in the same proportions recommended by Violle and Seigneurin but in powder rather than tablet form and in an amount three times that given in their report. The suitable proportions and effective amounts for a liter of water, therefore, are as follows: potassium permanganate, 3.0 mg.; iodide, 60 mg.; iodate, 30 mg. and citric acid, 60 mg.

2. As such, it has been observed that the mixture:
   a. Immediately lowers the pH and imparts about 12 ppm. of iodine to a canteen volume of distilled water.
   b. Destroys within 20 minutes approximately 200,000 cysts of Endamoeba histolytica and 2,000 each of colon, typhoid, paratyphoid and dysentery bacilli in a liter of distilled water containing 10 ppm. or organic nitrogen.
   c. Is more stable than Halazone at 150° F. and retains most of its sterilizing efficiency after storage at this temperature for three weeks.
   d. Imparts a brown color and an iodine taste that is tolerable to most but objectionable to some persons. This being an obvious disadvantage of the method, efforts are now being directed toward overcoming it.

3. Tablets, in contrast to the powder, were found to be impractical because they become hard on aging and are then too slow in dissolving. No satisfactory modification of the formula or method of manufacture could be found to overcome this disadvantage.

X-176 Effect of Temperature in Experimental Virus Diseases of Animals, Report #1.
Conclusion: It has been shown that mice experimentally infected with influenza, poliomyelitis and encephalomyelitis do not show any increased resistance to these infectious agents when they are placed in different environmental temperatures - warm and cold. On the contrary, the animals appear to become more susceptible.

X-184 Nutrition Survey of the Mess at Marine Barracks, Quantico, Virginia, December 13-20, 1943, Report #2.
Conclusion: Meals served in the two mess halls were found to be adequate in the nutritional factors for which analyses were made.

X-200 A Study of Possible Intoxication from the Use of Boric Acid Ointment in the Treatment of Burns. (Toxicity of Boric Acid demonstrated.) See Bumed News Letter, June 9, 1944.

X-203B Field Tests on Polaroid X-29 Aviation Type Goggles.
Summary and Conclusions: 1. The heating unit of the goggles functioned effectively in clearing the lenses when fogging occurred.

2. The goggles seldom fogged during altitude flights under the conditions of temperature and humidity encountered in these tests.

3. The design of the goggles lacks integration with that of the A-14 oxygen mask. They did not fit snugly and were, therefore, well ventilated. This reduces the likelihood of fogging.

4. Such fogging as did occur was caused by condensation of warm, saturated expired air from out-board mask leaks.

5. The heating wires appear as somewhat blurred vertical bands of varying density when looking at the sky or a sunlit background. They are much less apparent against a darker field.

6. These images become distracting during flights in rough air because of their movement during the repeated small compensatory movements of the eyes and head which result when normal postural orientation is disturbed.

X-235 Water Purification: The Use of Silver- Treated Diatomaceous Earth as Compared with Plain Diatomaceous Earth and Post-Filtration Chemical Treatment, Report #2.
Conclusions: There is insufficient data on the application of silver-treated diatomaceous earth to the sterilization of naturally contaminated waters, as encountered in the field, to warrant its recommendation for use in the place of filtration and post-filtration chemical treatment.

X-284 The Formation and Appearance of Tissue and Vascular Gas Bubbles after Rapid Decompression of Guinea Pigs from High Pressure Atmospheres, Report #1. See Bumed News Letter, May 12, 1944.

X-284 Changes in Specific Gravity of Tissues, Organs and the Animal as a Whole Resulting from Rapid Decompression of Guinea Pigs from High Pressure Atmospheres, Report #2.
Summary:1. There is a significant fall in the specific gravity of the animal as a whole after decompression from high pressures. This fall is greater in fat animals than in lean ones.

2. The specific gravity of fat tissue and adrenal gland is reduced on decompression from high pressure by extravascular (tissue) bubbles which were morphologically demonstrated.

3. The specific gravity of normal fat tissue and adrenal gland is inversely related to the total fat content and is directly related to the water content. The specific gravity of nerve, muscle, tendon and liver are estimated.

X-295 A Study of the Adequacy of Some of the Eating Facilities Available to Enlisted Wave Personnel Living in the Washington Area, Report #2.

X-319 Report on Fusion-Density Sun-Scanning Goggles.
Summary and Conclusions: 1. The preferences of twenty-three subjects favored slightly the fusion density goggle over the variable density goggle for sun-scanning. Most of the subjects preferred using one or the other goggle rather than no goggle at all, but there were some exceptions.

2. This, or any dark-lensed, enclosed goggle, tends to defeat its purpose by bringing about a certain degree of dark adaptation which is to some extent avoided by open spectacles.

3. It is suggested that the adaptation of Polaroid Aviation Goggle No. 1067 to the fusion density principle might have certain advantages, since dark adaptation would be reduced, and since the dark lenses need be used only when desired.

NMRI-58 Removal of Fuel Oil from Health Records. See Bumed News Letter, April 28, 1944.

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To: All Ships and Stations. BUMED-T-RLJ L8-2(072)

Subj: Requisitions for Medical Supplies and Equipment. 1 May 1944

Refs: (a) BuMed ltr L8-2(072), of 29 Nov 1943; N.D. Bul. Cum. Ed. 1943, 43-1688, p. 493, and BuMed News Ltr, Vol. 2, No. 13, 24 Dec 1943.
(b) Alnav 77-44; N.D. Bul. of 15 April 1944, 44-425.

1. The following instructions will become effective immediately upon receipt of this letter:

(a) All open purchase requisitions (Forms S & A 76 and 76A, and 44) requiring the approval of the Bureau of Medicine and Surgery will be submitted to the Bureau of Medicine and Surgery, Materiel Division, Sands and Pearl Streets, Brooklyn 1, New York.

(b) Items, not listed in the Supply Catalog of the Medical Department, coming under the following classifications, will be requested on NMS Form 4 requisitions, prepared and submitted in quintuplicate to the Bureau of Medicine and Surgery, Materiel Division, Sands and Pearl Streets, Brooklyn 1, New York.

NL-1	Drugs, Chemicals and Biologicals.
NL-2	Surgical Supplies
NL-3	Surgical Instruments and Appliances
NL-4	Special Department Supplies
NL-5	Special Department Equipment
NL-6	Hospital and Nursing Equipment
NL-11	Dental Supplies
NL-12	Dental Equipment
NL-13	Field Supplies
NL-14	Field Equipment
NL-15	Books

This paragraph modifies paragraph 2(a) of reference (a) letter.

(c) Existing instructions, pertinent to local purchase under authority of annual sundry purchase requisitions, are not affected by the foregoing.

(d) Every open purchase requisition will have entered on its face a statement to the effect that the cost thereof will or will not require an increase in the activity's allotment. --BuMed. L. Sheldon, Jr.

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To: All Ships and Stations. BUMED-Y-RGB
P3-2/P3-1(121-42)

Subj: Ambulatory Treatment of Venereal Disease.

5 May 1944

Refs: (a) Par. 2287, Manual of the Medical Department.
(b) Par. 1281, Manual of the Medical Department.

1. The increase in man-days lost from venereal disease is due in great part to the prevailing tendency on the part of medical officers to hospitalize such patients. Experience has shown that ambulatory treatment of acute uncomplicated cases of venereal disease does not decrease efficacy of treatment or increase the incidence of complications.

2. It is directed that all patients with venereal disease, excluding those of the Women's Reserve, be treated on an ambulatory status except:

(a) Gonorrhea: Complicated cases including those definitely proved sulfa-resistant.
(b) Early syphilis: During the actual period of infectivity and then only at the discretion of the medical officer. Usually infectiousness is controlled by the first two injections of an effective trivalent arsenical.
(c) Chancroid: Complicated cases only.
(d) Lymphogranuloma venereum and granuloma inguinale: These usually require hospitalization.

3. When a medical officer is not available, transfers or actual admissions may be made at the discretion of the hospital corpsman with the approval of the commanding officer.

4. Hospitals shall accomplish the discharge of venereal-disease patients to regular duty at the earliest practicable date.

5. In certain theaters of operation military efficiency may demand hospitalization of venereal-disease patients and such transfers shall be effected when directed by the commanding officer.

6. The sulfonamides are known to affect to a varying degree the visual, auditory, muscular, and mental facilities of some patients. A restricted-duty status should therefore be utilized when in the opinion of the medical officer such treatment would endanger life or materiel.

7. These instructions in no way modify reference (a) or reference (b), or relieve the medical officer of the attendant responsibilities in the proper treatment of venereal disease. --BuMed. L. Sheldon, Jr.

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To: All Ships and Stations.

P3-1/A16-1(011)
BUMED-LRN-elw

Subj: Serum Albumin (Human), Distribution and Use of.

10 May 1944

Ref: (a) BuMed News Letter, Vol. 3, No. 8, p. 4.

1. With adequate supplies of human serum albumin available, it is desirable that all medical officers become familiar with its indications and uses. It will now be issued on requisition (NavMed Form 4) to all naval activities so that medical officers can gain experience in its use before leaving shore stations.

2. This item appears in the Supply Catalog as follows:

Stock No.	Item	Unit
S1-1945	Serum Albumin (Human) - 25 grams in 100 c.c. diluent, with sterile accessories. Dating period 3 years.	Pkg.

3. Reference (a) summarizes the development and clinical experience with human albumin. Each gram will draw about 18 c.c. of fluid into the blood stream (25 Gm. = 450 c.c.) within 15 to 30 minutes. This hemodilution is maintained when the circulating blood volume is diminished. If the blood volume is normal, the extra fluid is eliminated in 2-4 hours. One or 2 bottles (25-50 Gm.) are usually sufficient to combat mild or moderate shock. Much more may be required in severe shock and burns. Plasma and serum albumin may be used interchangeably except in the presence of very severe dehydration. In such instances additional fluid should be administered if albumin is used. However, no harm is done by the administration of albumin to a severely dehydrated patient until additional fluid is available. No limit on dosage or speed of administration is set if the circulation is not overloaded and the prothrombin level is not dangerously low.

4. The use of albumin to combat hypoproteinemia involves large quantities due to the fact that clinical hypoproteinemias usually have markedly depleted tissue reservoirs as well.

5. It is of utmost importance that the questionnaire accompanying each package be filled out immediately after using the albumin, and returned to the address given on the form. --BuMed. Ross T. McIntire.

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To: All Ships and Stations. BUMED-H2-MVH

Subj: Circular Letter M-6, Receipt, Transfer, and Disposition Card (NAVMED HC-3) - Preparation and Submission of. 13 May 1944

Ref: (a) Circ Ltr M-6, Appendix D, Manual of the Medical Department.

1. Subject letter and form have been revised and are reproduced below. Also, subject letter will be printed for distribution to holders of the Manual for insertion therein. In accordance with the revised letter, appropriate changes shall be noted on "Table of Contents" and in paragraphs 635 and 3509 of the Manual.

2. Requests for additional copies of the revised letter may be directed to BuMed. Reproduction of subject revised Circular Letter M-6 and form (NAVMED HC-3) follows:

APPENDIX D, MANUAL OF THE MEDICAL DEPARTMENT
Bureau Circular Letter M-6

Subject: Receipt, Transfer, and Disposition Card (NAVMED HC-3), Instructions Governing (635) and (3509).

(a) Subject card has been revised and only one card is now required. This card is to be used in the same manner as the two cards of the former printing were used. In the interest of conservation of paper the old type red and black cards are to be used until the present supply is exhausted. (The original only of this report is required by the Bureau.)

(b) Subject card is printed on 3" x 5" heavy yellow paper, is bound in pads of 75 cards. This card is to be submitted in strict compliance with the following instructions.

(c) In the case of officers of the Hospital Corps, including chief pharmacists and pharmacists.

(1) Upon original appointment.
(2) Upon promotion.
(3) Upon reporting for any purpose including temporary duty, admission or discharge from the sick list.
(4) Upon detachment.
(5) Upon separation from service.

(d) In the case of enlisted Hospital Corps, forward this card upon their --

(1) Enlisting or reenlisting in the Regular Navy or in the Naval Reserve. (If in Naval Reserve, state class.)

(2) Reporting of Fleet Reservist for active duty.
(3) Reporting of Naval Reservist for active duty.
(4) Reporting from another ship, station, or status.
  (aa) Received for further transfer.
  (bb) Admitted as patient for treatment, showing diagnosis.
  (cc) Returning to duty from treatment.
  (dd) Received for temporary duty.
  (ee) Received from temporary duty for permanent duty.
  (ff) Received as straggler.
  (gg) Received from custody of Federal or civil authorities.
  (hh) Received for instruction by orders from Bureau of Naval Personnel.
  (ii) Received from 10 or more days' confinement, or from "awaiting trial."
  (jj) Received from 10 or more days' leave.
  (kk) Reservist of any class received from another ship, station, or naval district.
  (ll) Received from "Under Instruction."
(5) Discharge (termination of enlistment for any cause, giving character of discharge), death, or desertion.
(6) Extension of enlistment, stating length of extension and effective date thereof.
(7) Entering into agreement to extend enlistment, stating length of extension and effective date thereof.
(8) Entering into agreement to reenlist on the date following that of discharge.
(9) Transfer to another ship, station, or status, to include:
  (aa) Man transferred for further transfer (in such case indicate "Via R.S. _____ and/or U.S.S. _____"). If this procedure would constitute a violation of security instructions, the card should state "confidential."
  (bb) Patient transferred, showing diagnosis.
  (cc) Patient discharged to duty, showing diagnosis.
  (dd) Transfer of staff hospital corpsmen to instruction by order of the Bureau of Naval Personnel.
  (ee) Man transferred from "Under Instruction" to permanent duty.
  (ff) Man transferred from Regular Navy to Fleet Reserve, stating class of Reserve and naval district to which transferred.
  (gg) Reservist transferred to other naval district.
  (hh) Fleet Reservist recalled to active duty; or other reservist transferred for a period of active training duty.
  (ii) Reservist transferred from one class to another.
  (jj) Reservist transferred to inactive status upon completion of active training duty period.
  (kk) Man transferred to retired list.
  (ll) Man transferred for temporary duty (show authority).
  (mm) Man transferred from temporary duty to permanent duty (show authority).

(nn) Advancement in (including acting appointment to permanent appointment) reduction in, or change of rating, stating from _____ to _____, giving date and authority.

(oo) Placing of staff hospital corpsman in confinement for 10 days or more to await trial.

(pp) Departure of staff hospital corpsmen on 10 or more days' leave.

(qq) Change of date of expiration of enlistment on account of "time not served" for any cause, showing number of days to make up.

(rr) Arrest by Federal or civil authorities.

(e) On the reverse of the card complete lines 11, 12, 14 upon original reporting. All activities complete line 15 on initial entry into the Hospital Corps. This line not to be completed on subsequent cards.

Complete line 13 upon transfer, admission to sick list, advancement or reduction in rating, and upon discharge for any reason.

Instructions regarding numbered lines

Line 1. Surname and Christian names must be spelled correctly and written out in full, surname first.

Line 1. (a) Show rank of officer or rating of enlisted man. State USN, F.R. or USNR. If female add V-10, if Negro so state.

Line 2. Show officer's file number or service number of enlisted man.

Line 2. (a) Show date of expiration of enlistment, if D.O.W. and 6 months so state.

Line 3. Always use title appearing on approved BuNavPers form BNP 639 and BNP 350. This form is usually on file in executive officer's office.

Line 3. (a) Show date of reporting.

Line 4. Always show specific purpose for which officer or man reported aboard -

(a) For duty.
(b) For temporary duty.
(c) For further transfer to _____.
(d) For confinement for _____ days.
(e) Treatment - give diagnosis and probable duration.
(f) For instruction.
(g) For any other reason.

Line 5. Be specific:

(a) Ship or station from which reporting.
(b) From original enlistment.
(c) From reenlistment.
(d) From desertion - state whether surrendered or delivered by civil or military police.

(e) From 10 or more days' leave show total number of days' leave exclusive of travel time granted during calendar year.
(f) From confinement.
(g) From sick list.
(h) From instruction - if under instruction at same activity.
(i) For any other reason.

Line 6. Show activity to which officer or man is transferred. Every individual leaving a ship or station must do so by orders from competent authority; always enter on this line the next activity to which he is to report. If this information would constitute a violation of security regulations, the card should be properly classified and forwarded through the office having cognizance of classified matter.

Line 7. Show any change in status -
(a) Discharged (show type - Honorable, Bad Conduct, Ordinary, etc.)
(b) Reenlisted.
(c) Agreement to extend enlistment for ____ years.
(d) Extended enlistment for _____ years effective from _____.
(e) Date of acceptance of appointment for officers (do not show date of rank).
(f) Change of rating from _____ to _____.
(g) Admitted to sick list.
(h) Declared a deserter.
(i) Confined.
(j) Granted 10 or more days' leave.
(k) A.O.L. or A.W.O.L.
(l) Any other reason.

Line 8. Show authority for any entry appearing on lines 3, 4, 5, 6, or 7 as follows:
(a) BuPers letter _____.
(b) Comdt. _____N.D. letter _____.
(c) Sentence of (general, summary, or deck) court.
(d) Comserforsubordcompac ltr. _____.
(e) Comserforsubordcomlant ltr. _____.
(f) Other fleet or command authority.
(g) Commanding officer.

Line 9. List technical specialties in which qualified. Assign mark on basis of 0.0 to 4.0 if observed. If not performing duty of specialty so state.

Technical specialties

Aviation Medicine	AVT
Chemical Warfare	CWT
Clerical Procedure	ClT
Clinical Laboratory Technologist	LbT

Technical specialties (Cont.)

Commissary	CmT
Deep Sea Diving	DiV
Dental Technology (General)	DGT
Dental Technology (Prosthetic)	DPT
Electroencephalography	ENCEPH
Electrocardiograph & Basal Metabolism	ElT
Epidemiology & Sanitation	EsT
Fever Therapy	FtT
Low Pressure Chamber	LPC
Malariology	MAL
Medical Field Service	MFT
Neuropsychiatry	NPT
Neuropsychiatry Clerical	NP-ClT
Occupational Therapy	OT
Operating Room Technique	OrT
Pharmacy & Chemistry	PcT
Photofluoroscopy	PfT
Physical Therapy	PhT
Property & Accounting	PaT
Qualified in Physical Education	QPE
Roentgenology	XrT
Sound Motion Picture	SMP
Embalmer	EmT

Line 10. List all special qualifications - assign a mark on basis of 0.0 to 4.0 if observed. The following is a list of special qualifications and abbreviations listed in BuMed. If a man possesses a qualification not listed, it should nevertheless be reported.

Special qualifications

Blood Plasma Therapy	BPT
Chemist	ChT
Medical Illustrator	MI
Multigraph	MhT
Oxygen Therapy	OTT
Photomicrography	PmT
Radium Plaque Adaptometer Operator	RPA OP
Registered Pharmacist	RgPh
Stenographer	StT
Submarine	SUB
Typist	TYP

Line 11. Name of next kin.
Line 12. Permanent address.

Line 13. The marks required on this line are to be assigned by -
(a) The medical officer.
(b) Hospital Corps officer.
(c) Dental officer in case of dental technicians only.
(d) Line commanding officer in case man is serving on independent duty.
Do not complete this line in case of officers of Hospital Corps.

Line 14. List here any explanatory remarks.

Line 15. This line is to be completed on original entry into Hospital Corps. This card is to be signed by medical, Hospital Corps, or commanding officer - enlisted Hospital Corpsmen are never to sign this card.

FRONT

NavMed HC3 (1944) **Receipt, Transfer and Status Card**

1. Name ..... 1(a) RANK or RATE .....

2. File or Service No. ..... 2(a) Exp. Enl. .....

3. Arrived ..... 3(a) Date Recd. .....
SHIP OR STATION

4. FOR .....
(Duty; Temp. duty; FFT; Treatment — *give diagnosis;* Instruction; etc.)

5. Received from .....

6. Transferred to ..... Date .....

7. Change in status ..... Date .....
(Dischgd., ext. enl., agreemt. to ext. enl., change rating, deserted, adm. sick list, confined, leave, overtime, etc.)

8. Authority .....
(BuPers; District Commandants; Fleet Commands; Commanding Officers; etc.)

9. Technical Specialty .....

10. Special Qualifications .....

IMPORTANT! **Continue on reverse. See instructions.**

BACK

11. Next of kin .....

12. Permanent address .....

13. PERSONAL QUALIFICATIONS — **Enlisted Personnel Only:**
(Indicate as: *Superior, Above average, Average, Below Average, Unsatisfactory.*)

Application ..... Cooperation ..... Dependability .....

Energy ..... Personality ..... Leader of men .....

14. Remarks .....

.....

15. **To be filled in on initial entry into Hospital Corps:**

Date of birth ..... Place of birth .....

Date of enlistment ..... Place ..... For .....

Rate and Class at enlistment ..... Date of Active Duty .....

_____

_____ U. S. N. ____

See Bureau Circular Letter M-6 for detailed iustructions relative to preparation and submission of this form.

--BuMed. Ross T. McIntire.

To: All Ships and Stations. BUMED-H2-MVH

Subj: Circular Letter M-7, Roster Report of the Hospital Corps (NAVMED HC-4) - Preparation and Submission of. 13 May 1944

Ref: (a) Circ Ltr M-7, Appendix D, Manual of the Medical Department.

1. Subject letter and form have been revised and are reproduced below. Also subject letter will be printed for distribution to holders of the Manual for insertion therein. In accordance with the revised letter, appropriate changes shall be noted on "Table of Contents" and in paragraphs 637 and 3510 of the Manual.

2. Requests for additional copies of the revised letter may be directed to BuMed. Reproduction of subject revised Circular Letter M-7 and form (NAVMED HC-4) follows:

APPENDIX D, MANUAL OF THE MEDICAL DEPARTMENT
Bureau Circular Letter M-7

Subject: Roster report of the Hospital Corps (NAVMED HC-4), Instructions Governing (637) (3510).

(a) The greatest care shall be exercised in preparing this report to the end that it shall be complete and accurate in all respects. This report shall always bear the signature of the representative of the medical department responsible for making it, and shall be prepared and forwarded via commanding officer immediately as directed in the following instructions. (The original only of this report is required by the Bureau.)

(b) When prepared and forwarded:

(1) Monthly - By all ships and stations, including Marine Corps activities and recruiting stations, as of midnight, first day of the month.
(2) Quarterly - By all district medical officers for the Fleet Reserve and Naval Reserve inactive, on April 1, July 1, October 1, and January 1.

(NOTE: Hospital Corpsmen loaned to or assigned to temporary duty or detached duty at an activity for which no Hospital Corps complement has been authorized will be reported by the activity to which they are permanently assigned as "Temporary duty at (ship or station)".)

(3) Decommissioning - Whenever an activity is placed out of commission.

(c) PERIOD COVERED BY REPORTS:

(1) Monthly - The month ending at midnight of the first day thereof.
(2) Decommissioning - The period since forwarding last report.

(d) Information contained on the face of the roster report to be filled in whenever submitted.

(1) The allowance "authorized" is the allowance authorized by the Bureau of Naval Personnel. These figures are obtained from the following official forms. These forms are usually on file in the executive officer's office.
    (a) For officers - BuNavPers form NavPers 350.
    (b) For enlisted Hospital Corps - BuNavPers form NavPers 639.
(2) The allowance "on board" shall be the number of commissioned Hospital Corps officers, chief pharmacists and Pharmacists (do not include H-V-(S) and W-V-(S) (H) officers), and enlisted Hospital Corps personnel permanently attached to the ship or station for duty. Officers and men ordered "under instruction" by the Bureau of Naval Personnel shall NOT be reported in this space.
(3) The authorized allowance of Hospital Corps technicians is obtained from either the BuNavPers form, NavPers 639, or the letter of transmittal to this form. In event there is no authorized allowance of Hospital Corps technicians, a request should be submitted to BuPers via BuMed setting forth numbers in each specialty required properly to man the activity. The numbers requested must be justified on a basis of actual need.

The abbreviations for technical specialties are listed below:

Technical Specialties

Aviation Medicine	AVT
Chemical Warfare	CWT
Clerical Procedure	ClT
Clinical Laboratory Technologist	LbT
Commissary	CmT
Deep Sea Diving	DiV
Dental Technology (General)	DGT
Dental Technology (Prosthetic)	DPT
Electroencephalography	ENCEPH
Electrocardiograph & Basal Metabolism	ElT
Epidemiology & Sanitation	EsT
Fever Therapy	FtT
Low Pressure Chamber	LPC
Malariology	MAL
Medical Field Service	MFT
Neuropsychiatry	NPT
Neuropsychiatry Clerical	NP-ClT

Technical Specialties (Cont.)

Occupational Therapy	OT
Operating Room Technique	OrT
Pharmacy & Chemistry	PcT
Photofluoroscopy	PfT
Physical Therapy	PhT
Property & Accounting	PaT
Qualified in Physical Education	QPE
Roentgenology	XrT
Sound Motion Picture	SMP
Embalmer	EmT

(4) "Enlisted, received or transferred since last report" includes all changes of station or status of all Hospital Corps officers, chief pharmacists and pharmacists, and enlisted Hospital Corpsmen occurring since submission of the last previous report.

(5) The term "staff" applies only to Hospital Corps personnel who are a part of the regular ship's or station's complement. It does not apply to any officer or enlisted Hospital Corps personnel temporarily attached for any reason. Temporary patient, passenger, or prisoner Hospital Corpsmen shall be shown on the reverse of the roster report under the appropriate heading, e.g., "Temporary duty", "Patients", "Passengers", etc. Personnel of the Hospital Corps ordered by the Bureau of Naval Personnel from the staff to "Under Instruction" on the same station will be shown as "transferred" to _____ and "received" for _____ instruction.

(e) The information contained on the reverse of the roster report shall list the names of staff Hospital Corps personnel by groups according to rank or rating. List nonstaff Hospital Corps personnel after staff personnel by classes according to duty status, e.g., "Patients", "Passengers", etc. Group each class by rank or rating and arrange the names in each group alphabetically, surname first. The following instructions apply to individual groups and classes:

(1) Officers - show duty or duties assigned and the original date of reporting.

(2) Enlisted staff Hospital Corps personnel - list those remaining on board at the end of the period reported.

(3) Patients - list those remaining on board at the end of the period reported. Do not list staff Hospital Corps personnel who are patients under this heading.

(4) Passengers - list those remaining on board at the end of the period reported, giving ship or station to which ordered.

(5) Temporary duty - list and give date and ship or station from which received.

(6) Under instruction - list only those placed under instruction by orders of the Bureau of Naval Personnel, giving course, dates of commencement and completion of course.

(7) For each column on the reverse the following instructions shall apply:

Column I: Names grouped by rank or rating and in alphabetical order, the surname first, then the Christian name and initials, or all names in full in case two or more have the same surname.

Column II: The rank or rate indicated by abbreviations; if retired, Fleet Reserve, or Naval Reserve, abbreviate as Ret., FR, or NR and show class.

Column III: Original date of reporting for duty, show by figures.

Column IV: Beginning of present tour of sea or shore duty; sea duty begins date of reporting to a U. S. naval vessel or foreign shore station; shore duty begins date of detachment from sea duty; show by figures. In case of men who have extended their enlistment or reenlisted under continuous service, this date will be the actual date of commencement of sea or shore duty, not the date of reenlistment or beginning of extension of enlistment.

Column V: Remarks. In this column, show present detail as "Ward", "Clerical", "Material Officer", "Laboratory", "X-Ray", "Dental Clinic", "Pharmacy", "On Sick List (with diagnosis)", "On leave (with expiration date)", "Confined", "Awaiting transfer to _____ (this will apply to all Hospital Corps personnel whose orders have been received but who have not been transferred as of date of report)", "Temporary duty at _____", etc.

Column VI: If technician, give abbreviated designation.

NOTE: The words "Show by figures" mean to use figures for date, e.g., 7-1-44 for July 1, 1944.

* * *

NAVMED HC-4
(REVISED 1944)

ROSTER REPORT OF THE HOSPITAL CORPS

To be submitted on the second day of the month
(See BuMed circular letter M–7)

U. S. _____

PLACE _____

DATE _____, 19____

TO: **Bureau of Medicine and Surgery.**

SUBJECT: Roster Report of the Hospital Corps for the MONTH ending MIDNIGHT 1st day of _____ 19____

FORWARDED _____

_____
Signature, rank or rate of Medical Department representative responsible for preparing report.

_____
(Commanding)

INSTRUCTIONS: Read Bureau of Medicine and Surgery Circular Letter M–7, Appendix D, Manual of the Medical Department, before preparing this report.

Allowance figures required in this table are obtained from BuNavPers Form 350 for officers and Form 639 for enlisted men

ALLOWANCE	COMMISSIONED HOSPITAL CORPS	CHIEF PHARM. AND PHARM.	TOTAL OFFICERS	C. PH. M.	PH. M. 1C	PH. M. 2C	PH. M. 3C	HOSP. APP. 1C	HOSP. APP. 2C	TOTAL ENLISTED
AUTHORIZED										
ON BOARD										

ENLISTED HOSPITAL CORPS TECHNICIANS

	AVT	CMT	DGT	DPT	ELT	EMT	LBT	NPT	NPTCL	ORT	PAT	PCT	PHT	XRT					
AUTHORIZED																			
ON BOARD																			

ENLISTED, RECEIVED, OR TRANSFERRED SINCE LAST REPORT [1]
(TO INCLUDE HOSPITAL CORPS OFFICERS, CHIEF PHARMACISTS AND PHARMACISTS)

NAME (SURNAME FIRST, CHRISTIAN NAME, AND INITIALS.) ARRANGE ALPHABETICALLY REGARDLESS OF RATINGS. (OFFICERS FIRST.) (A)	RANK OR RATE [2] (B)	R, T, E, REEN, EXEN, D, DES, DD, CR, S [3] (C)	DATE [4] (D)	RECEIVED FROM OR TRANSFERRED TO [5] (IF DISCHARGED GIVE CHARACTER OF DISCHARGE) (E)

[1] Including Hospital Corps patients and prisoners from other stations. Temporary changes in status or station of "staff" hospital corpsmen NOT to be reported.
[2] Indicate by abbreviation as directed in BuNavPers Manual, and specify F. R., N. R., or Ret. when indicated.
[3] R, received; T, transferred; E, enlisted; Reen, reenlisted; ExEn, extended enlistment; D, discharged; Des, deserted; DD, died; CR, change in rating; S, received as patient.
[4] Use figures, e. g., 7–1–44 for July 1, 1944.
[5] If transferred via some other ship or station indicate same.

CONTINUE THIS GROUP ON ANOTHER SHEET OF PLAIN PAPER, IF NECESSARY

REMAINING AT END OF MONTH

ARRANGE ALPHABETICALLY BY RANK OR RATE, OFFICERS FIRST

NAME [6] (SURNAME FIRST, CHRISTIAN NAME, AND INITIALS)	RANK OR RATE II	ORIGINAL DATE OF REPORTING III	DATE OF BEGINNING OF PRESENT TOUR OF SEA OR SHORE DUTY IV	REMARKS (STATE DUTY ASSIGNED.) IF SICK, STATE DIAGNOSIS AND PROBABLE DATE OF DISCHARGE. (IF ON BOARD AWAITING TRANSFER, STATE ULTIMATE DESTINATION) V	IF QUALIFIED TECHNICIAN, LIST SPECIALTY USE ABBREVIATION (LBT=LABORATORY) VI

[6] Alphabetically by ratings.

CONTINUE THIS GROUP ON NAVMED HC4A, IF NECESSARY

To: All Ships and Stations.

PERS-10D-JK
P16-4(A)

Subj: Certificate of Health and Immunization Required Prior Departure of Naval Personnel from the Continental United States.

11 May 1944

1. All commands authorized or directed to issue travel orders to naval personnel requiring their departure from the continental United States, including Government or commercial air, to the various areas where proper immunization is a vital prerequisite to entry therein, are directed to include in orders issued by them a provision substantially as follows:

"Prior to departure from the continental United States a certificate of health and immunization in accordance with the requirements of the Bureau of Medicine and Surgery must be secured." --BuPers. L. E. Denfeld.

* * * * * *

To: Commandants of All Naval Districts Except 10, 14, 15, and 17. Medical Officers in Command of all Naval Hospitals in the United States.

PERS-319-HBS
P16-3/00

5 May 1944

Subj: Utilizing Services of Officers Fit for Duty Awaiting Discharge from Treatment at Naval Hospitals.

1. Officers who have been detached all duty and admitted to a naval hospital in the U. S. for treatment are given a medical survey when ready for discharge from treatment. In many cases such officers are found fit for duty. From date of survey until action is taken by the Bureau of Medicine and Surgery and the orders are received from BuPers as much as one month may elapse resulting in the loss of the services of these officers for that period. It is considered the services of these officers should be utilized by the activity in which the hospital is located. In order to accomplish the foregoing, when a survey finding an officer fit for duty has been signed, the medical officer in command of the hospital will notify the district commandant, or the senior officer present of local activities when the hospital is not at or near a district headquarters.

2. It is desired that the district commandants utilize the services of such officers temporarily pending action on the medical survey and the receipt of orders from BuPers. In those cases where hospitals are located at considerable distance from district headquarters, it is desired that the local senior officer present utilize these officers' services temporarily until BuPers orders arrive, under such instructions as may be approved by the district commandants. It is desired to avoid extensive travel in connection with these temporary assignments.

3. The Bureau of Medicine and Surgery has recommended that these officers be discharged from the sick list when directed to report for temporary duty as outlined above. In case an officer is not assigned to such temporary duty, he will continue under treatment at the hospital. --BuPers. L. E. Denfeld.

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